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(54) A coupling assembly

(57) A coupling assembly comprises an outer tubular sleeve 1, a co-axial inner sleeve 7 in the outer sleeve and intended to receive a shaft 9 or other torque-transmitting member, and a co-axial elastomeric sleeve 5 in radial

compression between the outer and inner sleeves, the outer and inner sleeves having integral parts 13, 15 shaped to directly interlocate one with the other to radially bridge the elastomeric sleeve to provide rotational continuity in the event of failure of the elastomeric sleeve and to provide axial location there between.

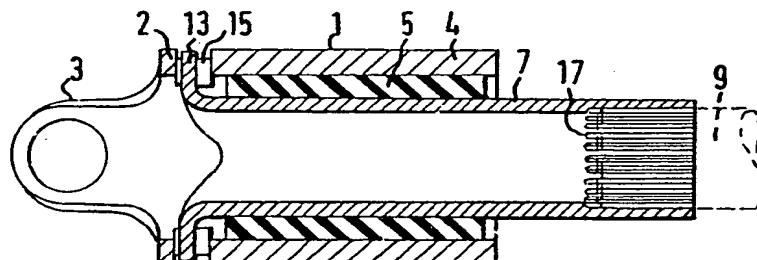


FIG.1

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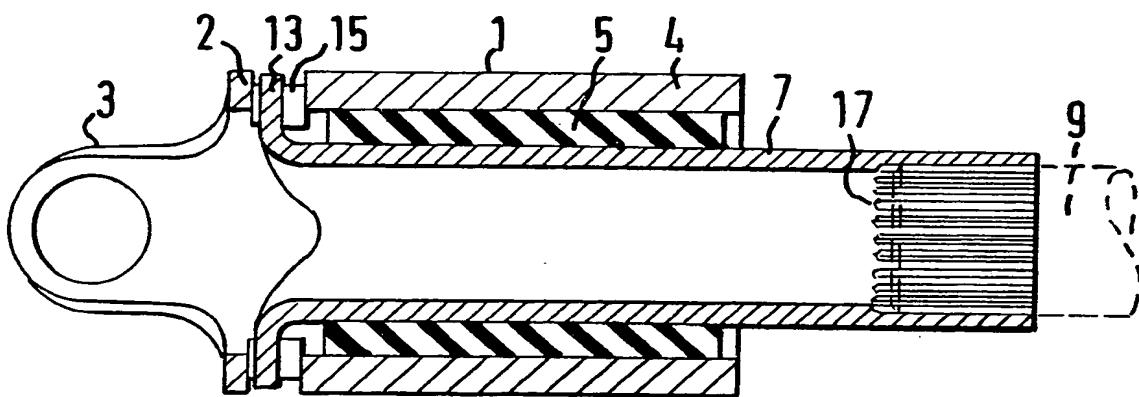


FIG.1

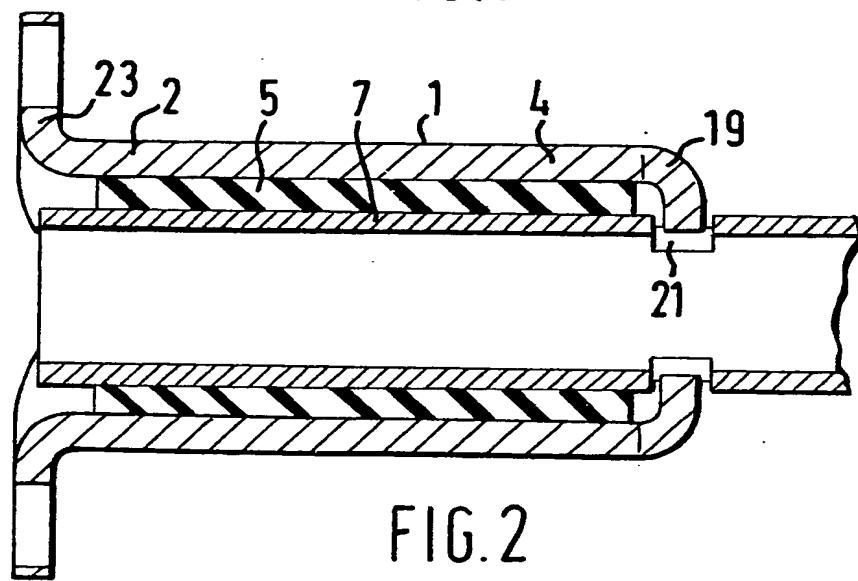


FIG.2

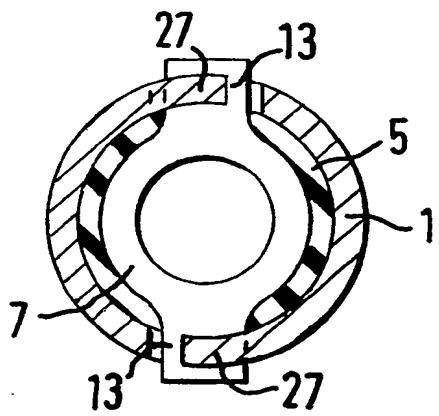


FIG.3

SPECIFICATION
A coupling assembly

The present invention relates to a coupling assembly of the type comprising an outer tubular sleeve, a co-axial inner sleeve in the outer sleeve and intended to receive a shaft or other torque-transmitting member and a co-axial elastomeric sleeve in radial compression between the outer and inner sleeves.

Such assemblies are already known with means fitted on to the shaft or inner sleeve to couple with the outer shaft in the event of failure of the elastomeric sleeve and maintain rotational continuity between the shaft or inner sleeve and the outer sleeve. Moreover further means are sometimes provided on these known assemblies to counteract relative axial sliding between the outer sleeve and/or the elastomeric sleeve and the inner sleeve.

It is an object of the present invention to provide a coupling assembly wherein the above requirement of rotational continuity means and axial location means are provided by integral parts of the outer and inner sleeves.

According to the present invention, a coupling assembly of the aforesaid type has the outer and inner sleeves shaped to directly interlocate one with the other to radially bridge the elastomeric sleeve to provide rotational continuity in the event of failure of the elastomeric sleeve and to provide axial location therebetween.

According to a first embodiment of the invention, the inner sleeve has at least one integral part shaped and folded to locate within at least one aperture or detent formed in the wall of the outer sleeve or at one end thereof.

In a preferred application of the invention, the outer sleeve is the hub of a universal joint, one end of the sleeve being shaped to form the two arms of the joint jaws.

The invention is illustrated, by way of example, by the drawings wherein:

Fig. 1 is an axial section of a first embodiment of a coupling assembly in accordance with the invention,

Fig. 2 is a similar section of a second embodiment, and

Fig. 3 is a transverse section showing a third embodiment of the invention.

As shown by Fig. 1, a tubular outer sleeve 1, in this example a part of a universal joint that has been shaped by known methods of cutting from a tube length or cutting, rolling and welding a sheet metal blank to have a fork with two arms 3 at one end 2 whilst the other end 4 of the sleeve forms the hub. An inner, preferably metallic, tubular sleeve 7 is nested co-axially within an elastomeric vibration damping sleeve 5 that is mounted, preferably bonded, on the inner sleeve 7. The elastomeric sleeve 5 is a force fit within the hub 4 so that it is in radial compression between the outer sleeve or hub and the inner sleeve. The inner sleeve 7 is of any desired sectional shape to internally receive a shaft 9 or other torque-

transmitting member.

Part of the inner sleeve 7, situated for example at the sleeve end proximate the fork arms 3, has at least one and preferably two diametrically opposed integral tabs 13 that are bent radially outwardly to locate within corresponding apertures 15 formed in the wall of the outer sleeve. The tabs 13 preferably do not, in normal operation, make contact with the outer sleeve. However, in the event of deterioration or failure of the elastomeric sleeve, the tabs 13 contact the sides of the apertures 15 to preserve rotational continuity; i.e. the tabs 13 radially bridge the elastomeric sleeve so that rotational drive can be maintained between the outer and inner sleeves.

Rotational or drive connection between the inner sleeve 7 and the shaft 9 is either by virtue of the cross-sectional shapes of the two parts or by means of matching axial splines 17.

One method of assembly is to mount the elastomeric sleeve 5 on the inner sleeve 7, insert this sub-assembly into the outer sleeve 4 and as this sub-assembly nears its proper axial position radially bending the tabs 13, such as by placing an appropriate conical stop near the end 2, to locate within the apertures 15.

By use of a sufficiently long inner sleeve, the assembly can form a transmission the drive effect of which is permanent, of variable length or even axially collapsible by the fracture under the action of a predetermined force of a part axially immobilising the shaft 9 within the inner sleeve 7.

Fig. 2 illustrates an assembly that is the converse to that of Fig. 1, although like parts have been given the same references. In this assembly, at least one and preferably two parts of the outer sleeve portion 4 are cut to form integral tabs 19 that are bent radially inwardly to locate within corresponding apertures 21 formed in the wall of the inner sleeve 7.

The other end of the outer sleeve 1 is, in this case, formed with two out-turned radial arms 23 forming a flange connection, the arms being disposed in a plane substantially perpendicular to the axis of the outer sleeve and, in known manner, permit the assembly to be attached to another element, especially an elastomeric disc. The outer sleeve of the embodiment of Fig. 1 could similarly be provided with out-turned radial arms instead of the fork arms of a universal joint.

The co-operation of the tabs 13 or 19 and the apertures 15 or 21 provide axial location in both directions between the outer and inner sleeves of the embodiments of both Fig. 1 and Fig. 2 and, consequently, of the elastomeric sleeve 5 when it is, as is generally the case, fast with the inner sleeve 7. In the case where the elastomeric sleeve 5 is not fast with the inner sleeve 7 the tabs form an axial abutment which would be desirable to provide at the sleeve end remote from the arms 3 or 23.

As an alternative to the apertures 13 or 21 and as shown by Fig. 3, detents 27 in either end 2 or 4 of either the outer sleeve 1 or the inner sleeve 7 could be used to co-operate with the tabs 13 or

19 to radially bridge the elastomeric sleeve 5 and again provide axial location in both directions.

The coupling assembly according to the invention can also be used to connect two shafts, 5 when the end 2 of outer sleeve 1 is, for example, split and has means to radially tighten the split end on to a second shaft.

The present invention is not limited to the examples described and shown but extends to any 10 shape of outer and inner sleeve that permits the one to directly interlocate with the other to radially bridge the elastomeric sleeve without the use of additional parts and provide axial location therebetween.

15 CLAIMS

1. A coupling assembly comprising an outer tubular sleeve, a co-axial inner sleeve in the outer sleeve and intended to receive a shaft or other torque-transmitting member and a co-axial 20 elastomeric sleeve in radial compression between the outer and inner sleeves, characterised in that the outer and inner sleeves are shaped to directly interlocate one with the other to radially bridge the elastomeric sleeve to provide rotational 25 continuity in the event of failure of the elastomeric sleeve and to provide axial location therebetween.

2. An assembly as claimed in claim 1, wherein the inner sleeve has at least one integral part shaped and folded to locate within at least one 30 aperture or detent formed in the wall of the outer sleeve or at one end thereof.

3. An assembly as claimed in claim 1, wherein the outer sleeve has at least one integral part

35 shaped and folded to locate within at least one aperture or detent formed in the wall of the inner sleeve or at one end thereof.

4. An assembly as claimed in any of claims 1 to 3, wherein the elastomeric sleeve is bonded to the inner sleeve.

40 5. An assembly as claimed in any of claims 1 to 4, wherein one end of the outer sleeve is shaped to form the two arms of a universal joint fork, the other end of the sleeve forming the hub.

45 6. An assembly as claimed in any of claims 1 to 4, wherein one end of the outer sleeve is shaped to form at least one radially extending attachment arm.

7. An assembly as claimed in any of claims 1 to 4, wherein one end of the outer sleeve is split and 50 has means to radially tighten the split sleeve on to a shaft.

8. An assembly as claimed in any of the preceding claims, wherein the inner sleeve co-operates with a shaft or other torque-transmitting 55 member by means of a spline system.

9. An assembly as claimed in any of the preceding claims, wherein a shaft or other torque-transmitting member is axially immobilised within the inner sleeve by means capable of fracturing under a predetermined load.

60 10. An assembly as claimed in any of the preceding claims, wherein the outer sleeve is formed by cutting a tube length or cutting and rolling a sheet metal blank.

65 11. A coupling assembly substantially as described with reference to or as shown by Fig. 1, or Fig. 2, or Fig. 3 of the drawings.